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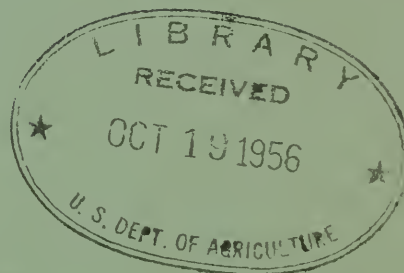
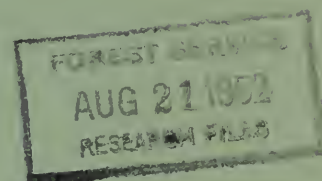
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Forest Service

STATION'S QUARTERLY REPORT

2nd Quarter

Calendar Year 1952



Northeastern
Forest Experiment Station
Upper Darby, Pa.



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EDITORIAL AFFAIRS

by Ted Larson

PUBLISHED DURING QUARTER

Bethlahmy, Nedavia.

1952. WHY DO PLANTS WILT IN COLD WEATHER?
Ecology 33: 301-303, illus.

Bickford, C. A.

1952. THE SAMPLING DESIGN USED IN THE FOREST SURVEY OF THE
NORTHEAST. Jour. Forestry 50: 290-293. ✓

Dill, Henry W.

1952. AIRPHOTO INTERPRETATION IN LAND-USE INVENTORY AND PLANNING.
Jour. Soil and Water Conserv. 7: 31-34, illus.

Flick, Frances J.

1952. THE GRADING OF LOGS AND TREES. (Bibliography)
Northeast. Forest Expt. Sta. Misc. Pub. (unnumbered). 16 pp. ✓

Holcomb, Carl J.

1952. A HISTORY OF THE MONONGAHELA NATIONAL FOREST.
Davis and Elkins Col. Hist. Mag. 5: 29-34. ✓

McGuire, J. R., Gilbert, A. M., and Wray, R. D.

1952. FOREST STATISTICS FOR WESTERN MARYLAND.
Northeast. Forest Expt. Sta., Forest Statis. Series:
Md. No. 1. 20 pp., illus.

McGuire, J. R., and Wray, R. D.

1952. FOREST STATISTICS FOR VERMONT. ✓
Northeast. Forest Expt. Sta. 47 pp., illus.

McLintock, T. F.

1952. COST OF PRUNING RED SPRUCE IN NATURAL STANDS.
Jour. Forestry 50: 485-486.

Sirmons, Fred C.

1951. HARVESTING THE FOREST CROP IN THE NORTHEAST-EAST AND THE
LAKE STATES. In Improvements in logging techniques
in the United States. Proc. United Nations Sci. Conf.
on Conserv. and Util. of Resources. Vol. 5: 234-242, illus.

- Simmons, Fred C.
1951. SAWMILL TECHNIQUES.
Proc. United Nations Sci. Conf. on Conserv. and Util. of
Resources. Vol. 5: 217-223, illus.
- Simmons, Fred C.
1952. HARVESTING FUELWOOD IN STICK FORM.
For. Prod. Res. Soc. Proc. 5 (1951): 183-186, illus.
- Simmons, Fred C.
1952. NORTHEASTERN LOGGING INDUSTRY AND NATIONAL DEFENSE.
Lumber Camp News 13 (12): 6-7, 21, illus.
- Simmons, Fred C.
1952. LUMBERING EQUIPMENT PROBLEMS.
For. Prod. Res. Soc. Jour. 2 (1): 52-55.
- Trimble, George R., Jr.
1952. A METHOD OF MEASURING INCREASE IN SOIL DEPTH AND WATER-
STORAGE CAPACITY DUE TO FOREST MANAGEMENT. Northeast.
Forest Expt. Sta. Paper 47. 8 pp.
- Weitzman, Sidney.
1952. MOUNTAIN LOG ROADS--DESIGN AND CONSTRUCTION.
W. Va. Conserv. 16 (3): 16-21.
- Westveld, Marinus.
1952. A METHOD OF EVALUATING FOREST SITE QUALITY FROM SOIL, FOREST
COVER, AND INDICATOR PLANTS. Northeast. Forest Expt. Sta.
Paper 48. 12 pp., illus.
- SUBMITTED DURING QUARTER
- Curry, John R., and Church, Thomas W., Jr.
WINTER INJURY OF CONIFERS IN THE ADIRONDACKS.
Lumber Camp News.
- Hart, Arthur C.
A TABLE FOR ESTIMATING PRODUCTION IN CUTTING SPRUCE AND FIR
PULPWOOD. Jour. Forestry.
- Hutnik, Russell J.
IDENTIFICATION OF VERY SMALL BIRCH SEEDLINGS.
Jour. Forestry.
- Hutnik, Russell J.
REPRODUCTION ESTABLISHMENT ON WINDFALLS IN A NORTHERN HARDWOOD
STAND. Jour. Forestry.

Little, S. and Moore, E. B.

MECHANICAL PREPARATION OF SEEDBEDS IN CONVERTING OAK-PINE STANDS
TO PINE. Jour. Forestry.

McLintock, T. F.

PRACTICAL MANAGEMENT OF SPRUCE AND FIR...SOME OBSERVATIONS.
N. Y. Forester.

Weitzman, Sidney.

LOGGING EQUIPMENT AND METHODS FOR MOUNTAINOUS AREAS.
W. Va. Conserv.

Weitzman, Sidney, and Trimble, G. R., Jr.

SKID ROAD EROSION CAN BE REDUCED.
Jour. Soil and Water Conserv.

Wright, Jonathan W.

POLLEN-DISPERSION STUDIES: SOME PRACTICAL APPLICATIONS.
Jour. Forestry.

FOREST ECONOMICS

by Marie Jackson

FOREST SURVEY

Reports

The long job of making proper deduction for logs not meeting grade specifications has been completed for Vermont, West Virginia, Maryland, and Pennsylvania. This has yet to be done for most of the forest districts of New York.

During the past quarter "Forest Statistics for Vermont" and "Forest Statistics for Western Maryland" have been published.

Reports have been written and typed for the seven survey units in West Virginia and for the state as a whole. These are now being revised in line with the new, revised edition of the Forest Survey Manual just received from Washington.

A report for central Maryland is being written. The tables for Eastern Shore, Maryland, have been compiled. The tables for the State of Maryland are now being compiled from the three unit reports. Computation of forest growth in Maryland will be completed by Gilbert in July.

A release for Forest District No. 7, New York, is in the process of publication and will be distributed in July. Survey reports for Forest Districts Nos. 3, 4, and 12, New York, will be compiled during the next quarter.

Field Inventory

With the completion of Cattaraugus County the field inventory job for the State of New York came to an end. The field office at Bath, N.Y. will be closed shortly and the New York crew transferred to Clearfield, Pa.

Since most of the field work in Pennsylvania is located in the central and western section, we have moved our Survey office from Harrisburg to the S. B. Elliott State Forest near Clearfield, Pa. One student from Penn State has been assigned to this office for the summer season.

Examination of field plots in Connecticut was initiated in New Haven County in late June. A temporary field office has been set up in the office of the District Forester at Pleasant Valley, Conn. Ted Grisez,

a Survey crew leader for the past 6 years, has been transferred to the Penobscot Research Center. A summer student assistant has been hired temporarily to fill the gap in crew personnel in Connecticut.

Commodity Drain

Field work for woods utilization studies in New York was completed during this quarter.

Office computations on Maryland drain were continued to a point where the job is now approximately three fourths finished. Office computations for New York State drain were started.

Photo interpretation and field examination for drain purposes got under way in Connecticut.

OTHER ACTIVITIES IN ECONOMICS

Mike Ostrander and John Bjorkbom spent the month of June in Maine where they conducted a timber quality survey for NENYIAC.

Our promising young author, Bob Wray, had an interesting article entitled "Be Your Own Guide" published in the current (June) issue of "American Forests." Bob also had an article published in the April 27th issue of the "Hartford Courant" entitled "Will Make Air Survey of Forests."

Solon Barraclough has been completing a problem analysis of research problems in the economics of forest management. He also attended the annual Farm and Home Week at the University of New Hampshire and gave a talk on forest ownership in New Hampshire. And he made a report on input-output research in forestry at the annual meeting of the New England Research Council held at the University of Massachusetts.

Solon was appointed by the Governor of New Hampshire to serve as secretary of a special committee to draw up a long-range forestry program for the State. The first meeting of this group is to be held in July.

QUARTERLY REPORT ON

FOREST INFLUENCES AND FLOOD CONTROL SURVEYS

July 1, 1952



FLOOD CONTROL SURVEYS

by Norman R. Tripp

STATUS OF FLOOD CONTROL SURVEY REPORTS

Connecticut River.--In Secretary's Office.

Merrimack River.--Step 2 draft completed in manuscript.

Salt River.--Step 8 draft in process.

Allegheny River.--First draft in process.

Upper Susquehanna and Monongahela Rivers.-- No further progress.

Potomac River (Review Report).--Planned field work completed--further work awaiting additional funds.

NE-NYIAC--Resources Survey.--Still plugging along. No change in target date of February 1953.

- - - - -

Further Discussion -

We would like to begin by thanking Maevers for his contribution to the discussion. Particularly so because he has expressed so succinctly the point of view of a considerable number of people in the Department--the very point of view which we believe is much too restrictive and with which we are taking issue.

This point of view says that those of us who are in opposition misunderstand the objective of flood control. The difference of opinion is not

in understanding of the objective--that, of course, is to reduce flood damage--but rather in definition of the word "flood." What is this flood we are trying to control? Does it occur only on permanent streams? According to Webster a flood is -

A great flow of water.
A body of moving water.
A deluge.

The American College Dictionary says a flood is -

A great flowing or overflowing of water,
especially over land not usually submerged.

There is nothing in any of these definitions which confines flooding to the proximity of rivers and streams.

The 1936 Flood Control Act, Section I (from which Maevers quotes) sets up Federal policy. Section II of the same Act which sets up procedure and delimits responsibilities says -

That hereafter Federal investigations and improvements of RIVERS and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department and Federal investigation of WATERSHEDS and measures for RUN-OFF AND WATERFLOW RETARDATION AND SOIL EROSION PREVENTION ON WATERSHEDS shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture.....

There is certainly nothing here that limits us to consideration only of flooding by high stream stages.

Recently we investigated a flash flood on a small stream in Vermont. We found that, after an unusually heavy rain, water seeping through the ground or running over the surface down a steep mountain side had been collected by an old wood-hauling road. After running down the wood road for half a mile the water had turned onto a main highway. The highway was gutted out for nearly a mile before the water turned off into a small stream channel which parallels the highway. Further down the water had jumped over into the highway and again washed out a considerable length before returning to its channel. By Maevers definition, only that portion of the damage caused by water from the stream would be classed as flood damage--the damage above is no concern of ours because the water had never run in a normal geologic watercourse. Suppose that if instead of entering the stream the water had turned off the highway in the other direction, carrying its load of water and debris onto some farmer's field and ended there--by definition no flood,

no flood damage--we wouldn't even attempt to devise a program.

To us this seems a ridiculously narrow point of view and one which we have apparently brought on ourselves since we can find no mandate for such limitation. The flood we would prefer to control is "any unusual or unnatural damaging flow of water wherever it may occur." Any damage resulting from such a flow we would consider "flood damage."

We in Agriculture are charged with the protection and management of the soil resource to the end that it may continue to yield products beneficial to mankind without itself being deteriorated. Water is both a beneficial product and a deteriorating agent. From the land manager's point of view the mandate from Congress which charges the Department with responsibility only for waterflow RETARDATION instead of for waterflow REGULATION is sufficiently unfortunate in its limitation. Carrying functionalization to the point where one group is charged with developing plans for retarding the flow of water, while another group plans for improving the flows in the same area is bad enough. Further specialization, which would charge Flood Control with responsibility for retarding only that part of the flow which will cause damage within the narrow limits of a stream channel, piles absurdity upon absurdity.

Why should we force ourselves into specialization? Why should we limit ourselves to designing programs to deal only with the thousands of dollars in damages along our rivers when damage from runaway water over the land runs into the millions?

If our attitude is a hang-over from the traditional flood control programs as carried out by the Corps of Engineers, it is time we took a fresh look at our own responsibilities.

If this attitude comes as a reflection of present thinking in the Congress it is high time the true facts are presented to them in proper perspective.

Our job is to conserve the land and water resource. If we can pick up some incidental benefits along the rivers, all the better, but let's don't get the cart before the horse.

FOREST INFLUENCES

DELAWARE BASIN RESEARCH CENTER

by Irvin C. Reigner

General

The highest annual rainfall since the beginning of measurements at the Dilldown Watershed, a record of 60 inches set last hydrologic year, probably will be broken this current year. By the end of May, over 50 inches of precipitation had fallen over the watershed, as compared with less than 44 inches during the same period in the record year of 1950-51.

With four more months in this hydrologic year still to be accounted for, total rainfall should easily exceed 60 inches.

Even with this exceptionally high rainfall, over 10 inches in April and almost 7 inches in May, one of the worst spring fire seasons on record was experienced in the Dilldown area. This was due mainly to poor distribution of rainfall during the most critical period. No rain fell from April 24 to May 10, during which period temperatures were high, humidities low, and the vegetation not yet in leaf.

Fortunately, the watershed escaped burning, although it took fast, efficient control by Gene McNamara and his associates on May 8 and 9 to put out two incendiaries in the adjacent drainage.

Soil Moisture Studies

Charley Carlson of the Southern Station, now on detail to the Vicksburg Infiltration Project, visited the Research Center in May to review our soil moisture studies. From previous contacts between the Center and the Vicksburg Infiltration Project, the latter found a need for the Delaware Basin soil moisture measurements, tabulations, and calculations to date. As these calculations were not complete throughout the periods designated by the Vicksburg Infiltration Project, and as the desired form of the tabulations was somewhat different from our form, considerable clerical work was necessitated to complete and transcribe the data.

Ultrawet and Kriliun Tests

Bethlahmy and Reigner assisted Dr. W. E. McQuilkin of the Anthracite Research Center in the establishment of plots testing these two soil conditioners. The plots are located on strip mine spoil banks in the vicinity of Wilkes-Barre.

The ultrawet study, which was established about the beginning of May, tests the effect of the chemical on the direct seeding of red pine. These

plots are on generally level ground and additional plots were established on steep slopes which were treated with the chemical and then seeded with a grass mixture.

Krilium, which was not delivered until June, was used to treat seedlings planted earlier this season. The trees were treated individually and at random, causing plots to vary considerably in size. The effect of krilium on survival and growth will be noted during the next two years.

As in the ultrawet study, krilium was applied to plots on steep slopes to determine any effect on decreasing erosion on loose, unconsolidated material at these steep slopes.

Ned Bethlahmy will later test the effect of both soil conditioners on increasing infiltration. However, the difficulty in measuring infiltration on slopes of 45 degrees or more appears to be considerable.

Scrub Oak Conversion

Continuing the search for the best adapted species to be planted on scrub oak lands and the most efficient techniques to establish them, several small interrelated studies were begun this spring. Two hardwood species not previously tested, tulip poplar and black cherry, were planted. High quality red oak acorns were seeded by two methods, directly into the native soil and in cardboard cartridges containing a more fertile soil.

In conjunction with the new species tests, openings were prepared in the brush by poisoning in which the young plants might grow without competition. The most promising of the coniferous species were planted in these poisoned spots in addition to the above species. Similar plantings were made in adjacent untreated plots to serve as a control on the site treatment. The new species were also planted under the various methods of mechanical site preparation tried previously.

Another related study was begun to test more fully the effect of various herbicides and different concentrations of each on scrub oak brush. Plots were established on the fire lines surrounding the experimental forest to study these variables and larger stretches of fire line were treated with a high concentrate poison to determine costs of controlling brush on fire breaks.

All studies were undertaken jointly by the Northeastern Station and the Pennsylvania Department of Forests and Waters.

Interception

All previous installations at Dilldown and at the Pocono Experimental Forest measuring thrufall and stemflow were reactivated this spring. One new stemflow installation--on rhododendron within the high forest stemflow area at

Dilldown and beneath the overstory--is in the process of establishment. Certain improvements in the old installations have been made including the replacement of some of the stemflow collector cans with much larger containers. A fifty-five gallon oil drum has been installed at each of two nine-inch beeches, while two eight-inch red maples and a six-inch ash each required twenty-five gallon collectors. These capacities are necessary to collect the stemflow from a two-inch rainfall and we hope to avoid overflows this season.

Advisory Council Meeting

Split Rock Lodge in the Poconos was the locale of the annual meeting of the Northeastern Forest Research Advisory Council. Held Friday and Saturday, June 13 and 14, the meeting was well attended by members and guests from industries, state forestry services, schools, and the Federal Service.

Following opening remarks by Chairman Paul Koenig, members of the Station Staff discussed present research activities in the Northeast and special problems of the Experiment Station program. Regional Forester Swingler spoke on the Timber Resource Review and Fred Simmons discussed findings of the Equipment Manpower Survey. Dr. E. C. Crafts, Assistant Chief from the Washington Office, brought the group up to date on the latest Forest and Range Legislation before Congress.

Marinus Westveld spoke on evaluating forest site quality by the use of plant indicators and soil survey data. Dr. Bill Bramble discussed plans for research in oak wilt in Pennsylvania.

A movie prepared by the Interstate Commission on the Delaware concerning its program to utilize the water resources of the Delaware Basin was shown Friday evening. A highlight of the meeting was the flash announcement by Dr. Crafts of Mr. Swingler's promotion to Assistant Chief of the Forest Service.

Saturday morning, the group journeyed to the Delaware-Lehigh Experimental Forest. Storey and Reigner explained the major phases of the Dilldown Watershed project as the various points of interest were visited, while Dr. McQuilkin told the group about the scrub oak conversion program.

Personnel

Ned Bethlahmy has been on leave most of June increasing his considerable knowledge on forest soils. Ned is attending a forest soils seminar being given by Dr. Coile at Duke University.

Harry Price, our versatile clerk, accepted a transfer to the Southern Station during the quarter. He is now located at the Gulfcoast Research Center, Gulfport, Mississippi. We were not happy about Harry's departure, as he had been with us since the establishment of this Center and was very capable. However, he has been ably replaced by Miss Ann Coachys of Bethlehem. Besides having the ability to learn our varied and sometimes complicated routine in

short order, Ann helps considerably to brighten an otherwise drab office.

Ed Read and Ernest Kurmes, students at Lehigh University, have been hired to help with the soil moisture tabulations. Following the completion of this work, Ed will be our summer field assistant.

Visitors

Dr. Marquis spent two days with us in May going over the influences work at Dilldown and at the Pocono Experimental Forest. This Center has the distinction of being the first to get our Director stuck in the mud, then adding insult to injury by splattering him with mud from head to toe.

Dick Trimble of the Mountain State Research Center spent most of one week here observing our soil moisture procedures in detail.

Spence Potter, who is now engaged in analyzing frost data in Upper Darby, was given a look at the field installation in the vicinity of the Pocono Experimental Forest by Ned Bethlahmy.

Hal Wilm and Walt Zillgitt of the Washington Office paid a brief visit to the Delaware-Lehigh Forest during their inspection of the Station. While at the fire tower we gave them a taste of thunder, lightning, cloudburst and heavy wind.

MOUNTAIN STATE RESEARCH CENTER

by the Mountain State Staff

Rain Gage Pattern

We began our watershed study on May 1, 1951, using 15 standard rain gages on the five watersheds--approximately 26 acres per gage. At the end of one year of operation we have reduced the number to 10. Working with alternate Horton-Thiessen areas we found that the differences in watershed precipitation using measurements from 10 gages as compared to 15 were negligible. The comparisons were made both on a basis of monthly precipitation and on a basis of storms over .5" of rain.

Runoff as a Percent of Rainfall

The following table shows by months what percent of the precipitation ran off our watersheds during the growing season of 1951.

Month	Watersheds				
	#1	#2	#3	#4	#5
May	46.90	59.55	57.46	51.31	No record
June	34.63	41.07	39.38	40.26	No record
July	17.43	22.36	28.43	25.89	24.81
August	1.00	3.00	3.11	1.54	3.26
September	.32	.98	1.57	.65	2.34
October	.49	1.40	1.41	.05	1.48

Canopy Effects on Precipitation

During the dormant season of 1951 and 1952 we studied the effect of a fully-stocked hardwood canopy (without leaves) in reducing the amount and intensity of ground rainfall.

Five recording rain gages were placed at random in an area of 50-year old hardwoods. Elevation, aspect, and slope position were similar for all gages. The control consisted of a recording gage in a 1/2 acre cleared plot within 100 yards of any canopy gage and similarly located with respect to elevation, aspect, and slope position.

Three comparisons were made between the measurements recorded at the open and canopy gages: (1) The amount of rainfall or throughfall, (2) maximum 5-minute intensities, (3) maximum 15-minute intensities.

Throughfall

The average difference, based on 33 storms, between ground rainfall in the open and under canopy was highly significant. $t = 8.1161$. The storms varied in amount of rainfall from .04" to approximately 1.50". The data plotted as a straight line, i.e. ground rainfall under canopy plotted over ground rainfall in the open. The following regression equation was determined to estimate ground rainfall under a canopy from that in the open:

$$Y = -0.00618 + 0.789x$$

Where Y = rainfall under canopy and x = rainfall in the open.

Using this equation the proportion of rainfall to reach the ground for several storms of different sizes is given below:

<u>Open Rainfall</u> (inches)	<u>Throughfall as a</u> <u>percent of rainfall</u> (percent)
.10	73
.50	78
1.00	78
2.00	79
4.00	79

The differences between catches in the several gages under canopy were relatively small. Standard deviations from the average throughfall for any one storm were generally less than five percent.

Intensities

The differences in intensities in the open and under canopy were highly significant for both 5-minute maximum and 15-minute maximum intensities. As would be expected, intensities under canopy were less than open rainfall intensities. Averaging all storm data, the effect of canopy is to reduce 5-minute maximum intensities by 19 percent and 15-minute maximum intensities by 15 percent.

As in the case of throughfall, standard deviations from the canopy average for any one storm were generally very small.

This study is being continued through the summer to test the effect of the same canopy when the leaves are out. We expect to have a full report ready in the fall of 1952.

FOREST UTILIZATION SERVICE

QUARTERLY REPORT, APRIL - JUNE, 1952

TIMBER RESOURCE REVIEW

Mr. Lockard spent about five weeks in Washington, D. C. working on plans for the forthcoming Timber Resource Review. He served on task forces dealing with inventory, growth, drain and wood utilization.

TIMBER CONVERSION

Integrated Utilization

At the request of Professor Arnold Hosmer of the Harvard School of Business Administration, who is acting as consultant to the Brown Paper Company and Heywood-Wakefield Furniture Company in their integrated utilization project, Mr. Simmons spent two days in May at Gorham and Berlin, New Hampshire advising on the logging and sawmilling phases of the project. An eight foot Prescott band mill has been purchased with a carriage especially adapted to take four foot bolts. Foundations for the sawmill are in, and a conveying, slashing, and sorting system for converting tree length hardwood to saw and pulp bolts has been installed. A number of recommendations were made for changes in the plans. The most important were for the installation of automatic networks on the carriage and the purchase of a horizontal resaw. Calculations indicated that the production necessary to make the project economically profitable could not possibly be attained if all the sawing of 4/4 stock was to be done on the headsaw and that probably a man could not be induced to ride the carriage at the speeds and frequent reversals necessary.

Storage of Logs

The current slow state of the market has brought a number of inquiries for methods of storing logs to forestall damage from decay, stains, checking, and insects. One lumber company in western Pennsylvania is accumulating high grade black cherry veneer logs from a National Forest sale for which there is no present market. Storage under water was advised, if at all possible. A lumber company in northern New York State has an insect infestation in decks of high quality yellow birch. This inquiry was referred to the cooperating branch of the Bureau of Entomology and Plant Quarantine at New Haven, Connecticut. A veneer company in

northern Maine, which has provided water storage for its normal summer supply of about two million feet of birch logs, finds itself with more than twice that much on hand due to the slow market. Construction of additional ponds is being considered, but suitable sites are not available close to the plant.

Separation-Hemlock Bark from Wood

Instigated by Walter Koepp of the Michigan College of Mining and Technology, the Eastern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry has been experimentally attempting to separate bark from wood in chips from hemlock slabs. The first large scale run was from hemlock slabs shipped in from northern Michigan, about $1\frac{1}{2}$ years old and about 10 percent moisture content when they were shipped. The slabs were chipped at the Carthage Machine Company, Carthage, New York on one of their new horizontal feed chippers and then shipped to Philadelphia for separation. A portion of the bark was lost in chipping and shipping so that when received at Philadelphia the chips only contained 28 percent bark instead of the 35 percent that was probably present on the original chips. When run through the separating device the following results were recovered from 100 lbs., dry weight of chips:

	<u>Wood Content</u>	<u>Bark Content</u>	<u>Total</u>
Wood fraction	51 $\frac{1}{2}$ lbs.	$\frac{1}{2}$ lb.	52 lbs.
Bark fraction	16 $\frac{1}{2}$ lbs.	23 $\frac{1}{2}$ lbs.	40 lbs.
Fines	4 lbs.	4 lbs.	8 lbs.
	<u>72 lbs.</u>	<u>28 lbs.</u>	<u>100 lbs.</u>

The bark fraction was considered satisfactory for tannin extraction since it contained 10 percent tannin. The wood fraction should be satisfactory for pulp chips. The fines probably would only be useful as boiler fuel.

An attempt is now being made to determine how nearly green the slabs can be when chipped for satisfactory results. Northeastern FUS is attempting to help find a supply of fresh hemlock slabs in northern New York State close to Carthage which can be piled at the machine company yard and from which enough slabs can be removed to make about 500 lbs. of chips for shipment to Philadelphia every 60 days. With the help of C. D. Kingsbury, Superintendent of State Forests of the New York State Conservation Department, a mill has been located at Croghan about 15 miles southeast of Carthage, that is currently receiving green hemlock logs. The Conservation Department has offered to haul the slabs from Croghan to Carthage in state trucks.

SEASONING

Mr. Peck from the Forest Products Laboratory installed a fourth set of beech lumber piles in study of air seasoning at the J. Henry Disston and Sons, Inc. in Philadelphia, Pennsylvania in May. This dried very rapidly and was taken down and inspected in June. This completes the experiment. As soon as all the lumber has been made into handles and yield data are available, a final report can be written.

Mr. Simmons gave a talk on package piling of lumber at the annual meeting of the Vermont Bureau of Industrial Research.

They Keystone Dry Kiln Club held its spring meeting at Williamsport, Pennsylvania on April 4. Host to the group was the Cromar Flooring Company. After an inspection of the plant there was an informal discussion period followed by a dinner at which Mr. Peck of the Laboratory presented his talk on lumber unit package piling. About 35 kiln operators and plant manufacturers were in attendance. Mr. Robert Petit of the Safety Table Company, York, Pennsylvania was elected president and Mr. Albert Parkins of the J. Henry Disston & Sons, Inc., Philadelphia, Pennsylvania was elected vice president. Professor William Nearn of Penn State College, State College, Pennsylvania was re-elected secretary-treasurer.

WOOD CHEMISTRY

May 13-21, Dr. Locke of the Forest Products Laboratory and Mr. Simmons travelled through northern New England and New York State and eastern Pennsylvania checking on new developments in chemical utilization of wood. Highlights of the findings during the trip follow :

Compreg

The Parkwood Corporation at Wakefield, Massachusetts is one of two firms in the United States still making compreg for the open market. About half their production at the present time is compreg for die stock and small products such as knife handle stock. About 50,000 clarinet bells-a use first suggested by Brundage of the Central States Station-have been made to date. At present, one of the experiments being made is aimed toward the production of a compreg golf club head. However, to date checking, within the wood of the component veneers, has been a stumbling block. The other half of their production is of decorative laminates, using a special impregnating paper manufactured by the Brown Company, Berlin, New Hampshire.

Urea Particle Board

A visit was made at the pilot plant for the production of Plaswood at Souhegan Mills, New Hampshire. At present production is being expanded. Most of the production is still of a 1/2-inch board with kraft paper on one side for linoleum underlayment, but production of a 5/8-inch board with asphalt covering on one side for sheathing is starting.

The Company is also making interesting molded products. An extruding machine has been developed to make about a 12-inch diameter core for reels for the shipment of rubber conveyor belting. These cores are extruded in a continuous rod and the sections are cut off with a deck chain saw. Other molded products being made include paper roll plugs and spool ends.

Chemical Debarking

According to Douglas Philbrook, manager of the Northeastern Pulpwood Research Center, between 50,000 and 60,000 cords of standing Northeastern pulpwood will be treated with sodium arsenite to expedite debarking this spring. Several tools have been developed to simplify the job of applying the chemical. The most successful is the McLeod tool developed on the Eastern Pulpwood Company operations in Maine, and marketed by Woodlands Equipment, Gorham, New Hampshire. This is a pull type tool with a box like front end the sides of which are sharp and the leading bottom edge rounded. The cost is \$45. Spud type tools for the same purpose have been developed and are being manufactured by Warren Axe and Tool Company, Warren, Pennsylvania and Snow and Neally, Bangor, Maine. A back pack pump applicator for the poison with a brush at the end of the hose is also being marketed by the Gorham concern.

A visit was made to the offices of the Woodlands Department of the Book Paper Division, International Paper Company, which is one of the half dozen companies actively engaged in this poisoning work. Officials of this company reported that training meetings in the application of the poison were being held throughout their wood procurement territory and that independent pulpwood jobbers were undertaking poisoning work with considerable enthusiasm.

Charcoal

Visits were made to the sites of the two Mellman charcoal retort installations at Tupper Lake and Speculator, New York, described in previous Quarterly Reports. Both were inoperative and the owners apparently had no intention of attempting to resume operation. The installation of five nine-cord Connecticut kilns near Warrensburg, New York, however was in active operation, making a very good grade of charcoal.

An experimental French can type of adaption of the Connecticut kiln near Speculator was temporarily down, but resumption of operation was planned in the near future.

Letts Burnetts

A visit was also made to the Walter Letts plant at Northville to see the briquetting operation. The feed mechanism of the original briquetting machine was being altered to take bagasse fiber which clogged into the mechanism developed for wood particles. None of these machines has been sold as yet.

Other Points

Visits were also made to the offices of Hercules and Atlas powder companies in Wilmington, Delaware to discuss wood saccharification; and in company with Drs. Harris and Hjany of the Forest Products Laboratory to Piccattiny Arsenal in New Jersey to discuss current and proposed cooperative projects, and to the Eastern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry.

PULP AND PAPER

In accordance with arrangements made during the Laboratory Program Conference, two shipments of pulpwood were made to Madison during June. One was about 1/2 cord of the Dunkeld variety of European larch from New York State for groundwood tests. This fast growing variety has previously been tested in sulfate pulping by the West Virginia Pulp and Paper Company at Mechanicsville, New York and found to give high yields and high strength paper. The New York State Conservation Department is planning a Journal of Forestry article covering the silvical and utilization characteristics of this species when the FPL tests are completed.

The other shipment was of old field white pine of three degrees of knottiness from the Station's Massabesic Experimental Forest in Maine. This will be pulped by the sulfate process at Madison to determine the effect of knots in this species on yields and qualities of pulp.

GENERAL

Forest Products Research Society

The Northeastern Section of the FPRS met in York, Pennsylvania May 23 and 24. Theme of the program was Materials for Wood Industries. Mr. Simmons presented film on Andersson log debarker. Mr. Lockard was program chairman.

Mr. Lockard attended FUS-FPL and FPL Program Conference at Madison, April 9-18.

Miscellaneous

Mr. Lockard participated in general Station inspection made by Mr. Wilm and Mr. Zillgitt of the Washington Office....Mr. Lockard and Mr. Simmons attended the annual meeting of the Station's Advisory Council in the Pocono Mountains, June 13 and 14.....Mr. Lockard attended a meeting of the Northern farm foresters at Smugglers Notch, Vermont early in June.....Mr. Simmons conducted an all-morning discussion on small saw-mill operation at the annual meeting of the Northeastern Lumber Manufacturers Association in New York City in May. He was substituting for C. J. Telford of the Laboratory who was unable to attend.....

FOREST GENETICS

by Jonathan W. Wright

Poplar clonal tests were established at Hopkins, Mountain State, and Beltsville, and also in Wisconsin and Michigan. These plantings were established as in previous years, with thorough ground preparation beforehand and cultivation the first year. Since the cuttings were stored in the new Beltsville cold room, were put into the ground a little earlier than in previous years, and received plentiful spring rain, they should get off to a good start. Presumably lack of these favorable conditions last year prevented good growth, for at the present time the 1951 plantings are making a much poorer showing than those put in previously.

Racial tests of green ash, similar to those established in 1951, were put in at both Hopkins and Beltsville. The stock was 2 years old, about 2 to 3 feet tall. The trees were individually labelled and randomized in planting. At Hopkins the plantings are to be cultivated the first year whereas at Beltsville each tree was mulched with wood shavings. The mulching seems to have been very effective on both the 1951 and 1952 plantings, keeping mortality low and growth as high as it would be in the nursery following transplanting. At least under Beltsville conditions the mulching was considerably cheaper than cultivation would have been. Smaller plantings of genetic pine stock were also made.

"Interracial" crosses (we hope for hybrid vigor from such crosses) in sugar maple were attempted, using female trees located near the Pocono. Because of lack of flowering the tests are smaller than had been hoped. Similar crosses planned in the ashes were abandoned because of inability to obtain pollen and general lack of ash flowering in the Philadelphia vicinity.

This spring an unusually large amount of interspecific crossing work in spruce was done. Many of the uncommon species in the Philadelphia area flowered well for the first time. The large amount of crossing work was also made possible by last year's discovery that spruce pollen could be successfully stored for a year.

Examination of last year's control pollinated cone crop reveals almost total failure in the white pines but fairly good success in the hard pines. Presumably the white pine cone drop was due mostly to insect damage occurring during the first year rather than during the second year as we had previously supposed.

This spring we did a fair amount of interspecific crossing work in the hard pines. Most of it was concentrated on crosses which had previously shown at least a little success. Nearly all the white pine work was concentrated on "interracial" crosses, using pollen from North Carolina, Wisconsin, Minnesota, and Massachusetts on native trees in the Poconos. The greatest difficulty encountered was in getting the pollen from northern localities collected and mailed in before the bagged female flowers were past the receptive stage. It was impossible to obtain Adirondack or Maine pollen in time for this year's work. Unfortunately year-old pine pollen doesn't work too well.

ALLEGHENY PLATEAU RESEARCH CENTER

Quarterly Report, April-June 1952

During this quarter Hough revised several manuscripts and submitted them for technical and editorial review.

Tabulations of the results of the ten year remeasurement of an 85 acre harvest cutting study on Allegheny National Forest were completed by May 1952. A report is in preparation.

Logging was completed on the 70 acre old-growth sale area on the Kane Experimental Forest by the Novosel Lumber Co. A tree selection marking was followed.

The sale on the 20 acre cutting practice level plots was not completed and will be extended beyond July 1, 1952.

Plans were made for the field season of 1952 and Hough and Church have already completed some of the assigned tasks.

STAND IMPROVEMENT WEEDINGS

Fifteen-year remeasurements of crop trees and stand tallies of trainers and weed trees have been completed on a sample of treated and check plots on weeding block #1 on the Kane Experimental Forest.

HARVEST CUTTINGS

Retakes of thirty photographs covering four blocks totaling 85 acres were made to show changes over a ten year period. These blocks were established in 1941 for the purpose of studying growth following sawlog harvest cuttings, which left 1,319, 1,654, 1,888 and 1,946 cubic feet per acre in trees 4" dbh and larger. This completes the field work on this study and the area will be marked for a timber sale by Ranger Stotz and his staff.

IMPROVEMENTS

A safety ladder attachment to be installed on the 50 foot water tank tower has been purchased. A chimney has been constructed and Franklin stove installed to provide a more comfortable and attractive staff quarters. Some interior painting and other maintenance work has been done.

VISITORS

Forest Supervisor Costley and L. Correll visited the Kane Forest.

PERSONNEL

Thomas W. Church, Jr., who recently completed work for his Master's degree at Duke University, reported for duty.

Arrangements have been made with Allegheny National Forest to employ Vehrland Ohlson from July 15 to September 15 to assist in a heavy schedule of fall remeasurements.

ANTHRACITE RESEARCH CENTER

Quarterly Report, April-June 1952

by M. C. Howard, W. E. McQuilkin and S. M. Filip

COMPARTMENT MANAGEMENT

The first and second cuts have been completed on the 19 acre farm woods. The second cut did not follow the established schedule as it was desirable to salvage the timber blown down in the November 24-25, 1950 storm. Scheduled operations provided for removal of poor trees and developing a forest of quality stems. The storm reversed this and felled some fast growing dominant black cherry. The owner now has less fast growing capital in the woods and more dollars for his labor. Harvesting mine props and fuelwood 197 hours of work brought \$.725 per hour while 141 hours getting out cherry sawlogs and fuelwood resulted in \$1.23 per hour for labor. No charges for stumpage, taxes or interest on the investment were made in arriving at these hourly earnings.

Logging cost computations to provide comparative data for the various levels of cutting practice continue to be a big office job. At the same time plans are going forward to develop a chemical debarking pulpwood operation.

Timber marking, inventory work, completion of the office building and grounds all keep the Pocono staff busy. It is necessary to truck in dirt to fill the water line ditch. The rocks taken from the ditch were used near the weir on the new bridge approaches.

REGENERATION AND SCRUB OAK CONVERSION STUDIES

No new plantings were put in this spring by the Anthracite Branch, but we assisted Reigner of the Delaware Basin Branch in a small study designed to explore the practicability of spot treating the brush with a silvicide preparatory to planting. We also advised and assisted McNamara of the State Department of Forests and Waters in a study of several silvicides and concentrations thereof for controlling brush on fire lanes. One series of applications in this study was put on in April and early May; a second series will be put on in late July or August.

On April 20, an incendiary fire of approximately 2000 acres in the Glen Summit Area over-ran that part of Game Lands 119 where some of our 1949 plantings are located. This was one of our first trials of planting

in bull-dozed furrows. The protection strip around the plots, which had not been burned out since 1949, was scheduled for reburning this spring. With 3 years' accumulation of fuel, the protection strip had no effect as a barrier. The fire ran into the plantings at several points but there it soon burned out because of breaks in fuel continuity that had persisted since furrowing. Loss of seedlings was estimated to be only about 10 per cent.

MISCELLANEOUS ITEMS

McQuilkin visited the Lake States during the week of May 12 to see heavy equipment that might be used for preparing scrub oak land for planting. The most promising outfit seen was a root rake mounted on a crawler tractor, which was being used to clear planting lanes through brush and small trees on lands of the Mosinee Paper Company in Wisconsin. Plans are being made to hire a root rake for trial in the scrub oak this fall.

In cooperation with the Delaware Basin Branch, test plots involving various soil treatments with Ultrawet and Krilium have been installed in the Anthracite Area, mostly on stripping spoils. The Ultrawet plots are part of a Service-wide series in which all experiment stations are participating, in cooperation with the Atlantic Refining Company. Designs for the tests were prepared in the Washington office. The Krilium tests were planned and requested by the Upper Darby office. Observations will include effects on survival and growth of grass and tree seedlings, and effects in reducing erosion on steep slopes. These may be supplemented with infiltration tests on the variously treated plots.

As a part of the Southern Station's cooperative study of geographic races of southern pines, the Anthracite Branch arranged for the growing of six lots of shortleaf pine in the state nursery at Mont Alto. McQuilkin visited the nursery on May 8 and supervised the sowing.

Intermittently during the past two quarters, as time and opportunity offered, McQuilkin has been reviewing literature and assembling data for a problem analysis of forest planting in the Northeast, with the major emphasis on species selection in relation to site. This preparatory work is continuing. We expect to have a first draft of the analysis sometime next fall or winter.

On June 13 and 14, Howard and McQuilkin attended the meeting of the Northeastern Station's Advisory Council at Split Rock Lodge in the Poconos. The program on the 14th was a field trip to the Dilldown area where the group was shown some of the planting experiments and watershed installations.

The Pocono staff assisted Jonathan Wright with his study on inter-racial crosses in sugar maple. A sugar maple bush located only a few miles from the Pocono Experimental Forest was found suitable for the study.

VISITORS

May 13 Director Marquis spent the day on the Pocono accompanied by H. C. Storey.

Thirty-five campers from Drexel Hill, Pa. were guided over the experimental forest June 14 by Rev. Kulp, Filip and Borneman.

COASTAL OAK-PINE RESEARCH CENTER

Quarterly Report, April-June 1952

BELTSVILLE EXPERIMENTAL FOREST

by R. H. Fenton and H. F. Ford

In May, the first deliveries of products from the strip cutting of compartment 40 were made to the sawlog cooperator at the roadside. These products were sawlogs, nearly all Virginia pine and pitch pine, and piling--also pine. The latter had been included in the cooperative agreement since the operator not only runs a mill but is a piling dealer as well. Thus far, 33 pieces of piling from 25 to 40 feet long and totaling 990 lineal feet have been cut and delivered and none was rejected. Prior to cutting, all trees in the first strip that appeared to meet piling specifications were so marked and reserved from cutting until a market developed for them.

The pine sawlogs went through the mill as fast as delivered. When opened up, the suspicion was substantiated that there might be considerable heart rot--red heart--in them. Quite a few when sawn were practically all cull and went into the slab pile. Our original log scale did not deduct enough for this factor since usually very little evidence of rot was visible at the ends of the logs. Hence a brief mill study, to be repeated at intervals, was made to determine a fair deduction to apply, comparing the total lumber tally, both cull and sound lumber, with the tally of sound lumber only. In a single random load of logs of about one MBF International scale, the study showed a loss of approximately 20% in lumber due to red heart. This will be taken into consideration in future scaling of logs from this lot.

This experience showed that the lot being logged is considerably over-mature, considering the species involved and the evidently low site quality. The average age of the pine is about 75 years, obviously too long a rotation under these conditions. How a similar stand would react to continuous management remains to be seen.

The other major product being cut from this compartment is pulpwood. The cooperator has hauled to date some 25 cords, using five and six cord trailers. At the first opportunity, the pulpwood elevator recently received here will be pressed into service. The wood currently being loaded out, however, is in such close proximity to the trailer trucks that there is little need of a conveying system at this particular site.

One other product, the disposal of which is yet to be arranged for, is fuelwood. A considerable quantity is accumulating as each of the strips

is cut mainly from hardwoods that are just under saw-log size but well-suited to cordwood production. It is hoped to locate a cooperator through whom this wood can be channeled to the reportedly lucrative fireplace wood market in the Washington-Baltimore residential area. Hardwoods are acceptable in the local pulpwood markets; but a price differential of \$2.50 per cord compared to pine does not seem to warrant cutting hardwood pulp.

RESULTS OF USE OF WOOD CHIPS FOR BEDDING DAIRY CATTLE

The Bureau of Dairy Industry at the ARC agreed to take several tons of chips produced from Virginia pine thinnings carried out on the Forest to give them a practical trial as cattle bedding. A comparison was made between the chips and dry sawdust. The chips were made from fresh-cut Virginia pine with a serrated knife setting of 1/16" x 1/8" in the C-9 Fitchburg wood chipper. They were discharged directly into our dump truck and immediately delivered to the BDI barn. The sawdust which is the bureau's conventional bedding consisted of fine dust from resaws and sanders to thin planer shavings about 1" square.

The bedding was used in a conventional stanchion-type dairy barn. A summary of the comparison is as follows:

Material	Bedding used for:		Volume used (cu.ft.)	Weight used (pounds)
	No. animals	No. days		
Wood chips	11	24	580	9,672
Sawdust	11	24	580	7,056

Comparing the weights of the materials used, 37% more wood chips were required than sawdust to provide approximately equal litter conditions.

It seemed from observation that the wood chips did not absorb moisture to the extent that the sawdust did. On the average, the animals appeared to stay cleaner with sawdust bedding than when wood chips were used. Nevertheless, the wood chips would make a satisfactory substitute.

VISITORS

The arrival of more clement weather seemed to stimulate the visitor business. Approximately 100 people all told visited the forest and were taken on a tour of the work.

In April, 56 Turkish agricultural trainees, some forester, were entertained. Language difficulties were evident.

In May, 24 county agents from West Virginia were shown the logging operation, some pine thinning plots and the CPL cuttings, and the hybrid poplar plantings. In June, we were visited by Chief Extension Forester W. K. Williams and later by a group of eight University of Connecticut students. Also a group of about ten Vo-Ag students were given an orientation tour of the forest for half a day.

Most of one day was devoted to a test of two powered brush cutting tools with W. O. personnel in attendance.

SUMMER STUDENTS ARRIVE

Bob James and Lee Herrington arrived in June for summer employment much of which will be running and marking compartment boundaries and making stand inventories of four compartments scheduled for cutting in the next two years. They have taken up residence in the lodge. Early in July, Fred Trew is expected to join the staff also for summer work.

PUBLICATIONS

Williamson completed a revision of a paper on the effect of pruning and releasing the growth of Virginia pine.

Fenton submitted a revised paper on a profitable new outlet for plantation thinnings.

A work improvement suggestion was submitted describing an attachment for chain saws to facilitate measuring and bucking pulpwood, devised by Sumner Ricker of the logging crew.

HYBRID POPLAR AND NURSERY WORK

An addition was made to the contemplated 30-acre hybrid poplar pilot plantation that was begun in 1951 at the Airport. Adjoining the 1951 planting, 3100 cuttings were planted on 6-foot wide strips that had been plowed in the fall and harrowed just prior to planting. Cuttings were spaced approximately $2\frac{1}{2}$ feet apart in the furrows.

Two hybrid poplar sapling test plantations of four blocks of fifty clones in randomized 16-tree plots were established. Two replicates were planted on a revegetated area at the Airport, and two on a site burned over in 1949. The latter site had been cleared with a bulldozer before plowing to remove sparse hardwood growth and pine trees killed by the fire.

A crop tree test of two replicates each of 25 clones in randomized 100-tree plots were established. Two replicates were planted in an old field and two were planted at the Airport.

Cuttings made during early spring and stored in the coldroom were shipped to Mountain State and Hopkins, and to cooperators in Michigan and Wisconsin. Cuttings distributed to areas for the first time were sterilized by the use of mercuric chloride to prevent the spread of leaf blotch caused by Septotinia populiperda.

Approximately 300 green ash seedlings grown at Beltsville as part of a test of geographic races were planted approximately 8 x 8 in furrows on an old field. Recently each tree has been mulched with wood chips. These were obtained by putting unlimbed young pine saplings through the Fitchburg chipper.

It has been necessary to cultivate newly-established poplar plantings once this season. Weeding in the nursery has required about four man days.

LEBANON EXPERIMENTAL FOREST

Quarterly Report, April-June 1952

by S. Little

On June 9 Robert F. Williams, a 1952 graduate of Rutgers University, reported for work. A second temporary assistant, scheduled to report on June 16, did not materialize.

Somes spent most of April working on maintenance and repairs of the Lebanon buildings.....Four working plans were submitted to Upper Darby during the quarter.....A new deep well, providing a much higher quality of water than the old well, was drilled in the Eastern Shore Experimental Forest. And District Forester Mohr had some more work done on the roads of that Forest.

EASTERN SHORE STUDIES

Summer-burn Study

Pine seeds of the 1951 crop fell in the study area at an average rate of 179,000 seeds per acre, according to the seed-trap records. Of these about 149,000 seeds were sound. In three of the four plots there was little difference (200-204,000) in the number of seeds caught, but in the other plot only about half as many seeds were caught.

Although this study area did receive a large number of seeds from the ten seed trees left per acre, the amount was not unusual for good seed years nor is it limited to loblolly-pond pine stands. From the good crop of cones in 1938 about 630,000 seeds per acre were caught under clumps of shortleaf and pitch pine in southern New Jersey, compared to more than 70,000 seeds per acre in a nearby area having only six seed trees per acre.

Other Studies

Surveys were completed for establishing a study of winter burning and shelterwood cutting in a mature stand in the Pocomoke State Forest. The 43-acre tract was split into 8 plots of about 5 acres each, using ditches and roads where possible. In the interior of each plot, a 1-acre sub-plot has been established. Although the whole of each 5-acre plot will be treated uniformly, stand conditions and changes will be measured only in the 1-acre units.

Areas were computed from the survey data of that and one other study area; and a local cubic-foot volume table for the farm-woodlot study was constructed.

NEW JERSEY STUDIES

Deer Repellent

Last fall two dilutions of Forestasan, a deer repellent made in Germany, were applied with a paint brush to small seedlings of pitch and shortleaf pine. (The previous year when this repellent was applied undiluted it had been highly injurious.) One dilution was composed of equal parts of Forestasan and water; the other, of one part of Forestasan to two parts of water. Only seedlings less than 1.1 feet tall were treated.

The dilutions killed only about half as many seedlings as had the undiluted repellent (7 percent), and damage to the terminal shoots of treated seedlings was reduced from 36 to 10 percent. The weaker dilution did less damage, killing the tree or part of the leader on 8 percent of the treated trees, compared to 21 percent by the other dilution.

Extent of damage again varied with the size of the treated trees. All seedlings killed were less than 0.4 foot tall. And the leaders were killed on 21.4 percent of the surviving trees in that size class, compared to 3 percent of the trees 0.4-1.0 foot tall.

Even though the dilutions were effective in repelling deer, they were still too injurious to be recommended.

Need for Hardwood Control After Prescribed Burning

Additional tallies and computations made during the last two quarters gave data showing a wide range in the need for controlling hardwoods after oak-pine stands had been prescribe-burned and cut. In the two studies where burning was discontinued after the winter of 1945-46 and seed-tree cuttings made in 1946-47, the areas burned 5 or more times (and shelter-wood-cut in the younger stand) now have 3,400-4,800 pines per acre, and 93-100 percent of the quadrats are stocked. But there is a great difference in the dominance of the pines, and in the need for cleanings or other measures of controlling the hardwoods and permitting the pines to form the next stand.

Much of the difference is due to the age of the oak overstory when it was cut. Most of the oaks in the area near Mount Misery were 52-77 years old when cut, while nearly all those in the Experimental Forest plots were only 24 years old. As might be expected, the younger, denser stand produced more sprout-clumps per acre and faster growing sprouts that have offered much more serious competition. Even though cleanings were made in the fall of 1948, today we have the following situation:

	<u>Mt. Misery</u>	<u>Experimental Forest</u>
Number of hardwood seedlings and sprout-clumps per acre	850	1,167
Quadrats with hardwoods more than 1.5 feet tall--percent	32	60
Average height of tallest hardwoods on those quadrats--feet	5.3	6.9

Partly because of the smaller amount of hardwood competition, pines in the Mt. Misery area are taller and dominate more quadrats than they do in the other plots. On the most frequently burned areas at Mt. Misery the tallest pines on the quadrats have an average height of 3-4 feet (maximum--11 feet), and pines more than 1.5 feet tall are dominant on 60-64 percent of all quadrats. In contrast, in the other study area the average height of the tallest pines on the quadrats is only 2-3 feet, and where both pines and hardwoods occur the pines are dominant on only 13 percent of the quadrats.

Evidently several prescribed burns followed by a seed-tree cutting would be effective in stands like that at Mt. Misery in increasing appreciably the proportion of pine from 12 percent of the trees larger than 2 inches (d.b.h.) to about 50 percent of the next crop. There cleanings that take about 5 man-hours per acre would permit the pines to form nearly a pure stand. In contrast, in the younger stand prescribed burning and the proper type of harvest cutting would provide little more than the maintenance of a pine seed source, unless heavy and costly cleanings (requiring about 15 man-hours per acre) or poisoning are used. Fortunately young stands such as were on the Experimental Forest area are not usually merchantable, and so are seldom cut.

MOUNTAIN STATE RESEARCH CENTER

Quarterly Report, April-June 1952

FARM WOODLAND COMPARTMENTS

General

Two areas on the Fomow Experimental Forest have been designated as farm woods compartments. Each year, during the winter months, an annual harvest is made from each. Treatment of both is on the level of the good practices in the compartment management studies.

The areas and results of management have two purposes: (1) We are testing the silvicultural and economic effects of an annual harvest from these areas, and (2) the areas serve as demonstrations of what can be done with small woodland areas in the State--both for farm groups and other small woodland owners.

Description of Areas

Each area is approximately 31 acres in size. Both have some comparatively level land as well as some which is very steep. While fire ranged over both areas after the cutting of 45 years ago, it appears that the burning was heavier on Compartment 21. The net result is about 20 percent more volume, as well as larger and better timber on parts of one than on the other. Both areas have dry ridge types, cove types and gradations in between.

Cutting

To date three cuts have been made on the area. The first was a salvage cut taking out the very poorest sawtimber trees. The second cut was a thinning from below which removed merchantable products only, mostly mine material and pulpwood. This last year a sawtimber cut was made. During the first cut all cull trees over 6" DBH were removed by girdling.

Efforts have been made to simulate farm conditions as much as possible in the harvesting of the timber. At first cutting was done by cross-cut saws. Skidding on one area was done by horses. It has now become impossible to hire a team. Also many farmers who work part time in the woods are using power saws. We have followed the change in practice by using our power saws and tractor in the farm woods. Similar tractors are available to farmers on a year round basis from the Soil Conservation Service.

Each winter season between $2\frac{1}{2}$ and 3 percent of the tree volume has been cut. Since products management is being stressed at the present rather than equal annual returns, and since considerable capital improvements have been made during these first three cuts, the annual return has varied considerably during the past three years. Until the low quality, low value understory and partially defective trees are removed, the annual return will continue to fluctuate.

Results

Table 1 shows the original volume of merchantable trees, volume per acre and total cut during the first three periods. It can be seen, however, from an inspection of Table 2 that the cut, which is almost equal for each area had a much lower value in Compartment 21.

Table 1. Stand Volume and Volume Cut

Compartment	Original Volume		Original Vol. per acre	Total Cut to Date	
	C.F. to 4" top	Acreage		C.F. to 4" top	
			C.F. to 4" top	Total	Per Acre
13	72,315	31.3	2,310	6,215	199
21	56,945	30.2	1,886	6,265	207

Table 2. Products Cut and Value in Dollars

Compartment	Sawlogs and Bars	Props	Pulpwood	Total
13	\$ 654.73	\$ 15.36	\$109.71	\$779.80
21	359.88	67.52	72.36	499.76

While it might be expected from the gross return that the hourly wages to the owner should be much higher for Compartment 13 (Table 3), over twice as much money was put into roads and permanent landings. The returns on Compartment 21 (74¢ per hour) are about equal to wages on all but the best woods operations in this country.

Table 3. Returns to Farmer (Owner)

Compartment	Gross Value Products	Cash Expenses of Operation <u>1/</u>	Net Return (Dollars)	Hours Worked	Return/Hr. (Dollars)
13	\$ 179.80	\$ 200.93	\$578.87	517	1.12
21	499.76	84.30	415.46	561	.74

1/ Expenses of operation are actual cash dollars paid out for materials, labor, or equipment hire or rates used in computing costs for other compartments on the Fernow. For this report, taxes, interest, protection, etc. were not considered.

COMPARTMENT MANAGEMENT STUDIES

Gull removal has been completed on Compartments 16, 20 and 27 by the use of Ammate.

Cutting has been completed in Compartment 16, good practices, and about 2/3 completed in Compartment 20, one of the fair practices compartments. The roads have been built in Compartment #18, high order compartment, which will be cut later on this summer.

VISITORS

Chief Lyle Watts, in company with Dr. Ralph Marquis and Bill Swingler, made an inspection of the Monongahela National Forest and the Mountain State Research Center. Our distinguished guests spent one day on the Fernow going over everything from the design of the experiments to the actual operations on the ground. At the conclusion of the inspection a private dinner was held for our guests, all Forest Service personnel in the State, as well as some distinguished guests in public service and private industry.

Bob Bain made his annual inspection here during the period. It is always good to have him because we usually get some good tips in fiscal matters, office routine and personnel management. Bob did a particularly good job of boosting the morale of our woods workers this year. Problems of leave, continuity of service, etc. were explained to the men at a "round the stump" discussion.

SHOW-ME TRIPS

The classes in silvics and in silviculture of the Forestry School at West Virginia University each spent a day on the Fernow. This is apparently becoming an annual event. We may expect even more of the classes to spend a day each with us each year.

A group of commercial logging operators came in to investigate our equipment, road building and various logging methods. Three of the four are reported to have changed their system of road lay-out as a result of the trip. Each is either buying or building some of the equipment being used on the forest.

The Upper Monongahela Valley Association met at the Fernow for its quarterly meeting and made an over-all inspection of our work.

About 33 members of the Big Hub 4-H Club from Elkins made a tour of the Fernow.

PERSONNEL

Sid Weitzman was toastmaster at the banquet held during the 1952 annual meeting of the West Virginia Forest Council in Charleston.

Sid Weitzman is combining business with pleasure by making an inspection of two of our research centers during his vacation. Carl Barr is also following suit. He is making a trip to the West Coast with stops in between at Research Centers where logging is going on.

Dick Trimble is at Duke University for a "quickie" soils course. We understand Ned Bethlahmy is there with him.

Sid and Dick spent a day with other members outlining the program for the Northeastern Forest Soils Group to be held here in Elkins the first week in September.

PUBLICATIONS

Dick Trimble's Station Paper #47, "A Method of Measuring Increase in Soil Depth and Water Storage Capacity Due to Forest Management" was released in April.

The second of a series of articles in the West Virginia Conservation magazine on the work being done at the Mountain State Research Center, was prepared by Sid Weitzman and published in the June 1952 issue. The title of the article is "Mountain Log Roads--Design and Construction".

SPECIAL STUDIES

A series of hybrid poplar plantings have been put in at various places in the neighborhood of Parsons.

A cooperative study with the Conservation Commission of West Virginia on the effect of different degrees of cutting on deer population and deer browse is being established on the series of compartments being currently cut.

NORTHERN HARDWOODS RESEARCH CENTER

Quarterly Report, April-June 1952

PILOT OPERATION STUDY AND CUTTING PRACTICE LEVEL PLOTS

Logging was completed for this fiscal year during this quarter. Logging costs and volumes of the products sold on the two compartments and the CPL plots were summarized.

The two compartments were cut under high-order cutting practices, but with different levels of growing stock reserved. However, due to the decadence of the unmanaged stands and the desirability of not cutting more than 35% of the gross volume, the cut per acre was almost identical. Product volume removed was 616 and 629 cubic feet per acre respectively. Table 1 shows comparable production figures.

Table 1. Production Rates on Two Compartments

Compartment	Total Cu. Ft. Net Volume	Cu.Ft. per man hour		Cu. ft. per tractor op- erating hour
		Skid	Cut, limb and buck	
27	39,587	44	25	60
29	36,514	53	28	72

Compartment 27 was logged during the fall on dry ground. Compartment 29 was logged on 3 to 6 feet of snow. Construction of tractor roads was a considerable expense on Compartment 29. When this expense is included the roadside costs were almost identical for the two compartments. The cushioning effect of the snow on the rocky terrain and the better main tractor roads combined to offset the additional costs of building the tractor roads and of working in up to 6 feet of snow. It is believed that one to three feet of snow would have provided ideal operating conditions on this area.

Water bars to prevent erosion on the main skid trails were installed at a cost of \$0.25 per 100 cu. ft. removed on compartment 29, and \$0.12 per 100 cu.ft. removed on compartment 27. Several severe rains have resulted in only nominal erosion to date.

A preliminary draft of the revisions of the compartment management instructions on inventory, quality, and volumes has been completed in co-operation with T. F. McIntock and Sidney Weitzman. Copies will be distributed for review in the immediate future.

Field work on the compartments to be cut this year was started during the month of June. The 100% initial inventory and reproduction and sapling tallies are practically completed on one 65-acre compartment. Marking of trees to be cut was initiated.

Field work has been slowed somewhat by our efforts to obtain a more complete picture of the quality of our stand on this compartment. All of the logs in one-half of our sample sawtimber trees are being graded to establish a measure of the value of our upper log material. The work to date indicates that it will reduce our production for cruising and marking from $2\frac{1}{2}$ acres to 2 acres per man day. This will not necessarily be a continuing expense since we hope to find a central tendency or a correlation that can then be applied to similar stands.

PAPER BIRCH REPRODUCTION STUDY

Establishment of Reproduction on Windfalls

As part of a paper birch reproduction survey, a study was made of the reproduction that became established on the 1938 hurricane blowdown areas in the Bartlett Experimental Forest. It was quite apparent that the species and the amount of reproduction varied greatly on the different parts of the uprooted area at the base of each windfall. Therefore, the reproduction occurring on each of these uprooted areas was classified into one of the following categories:

- (1) On the top edge of the uprooted soil portion
- (2) On the upper side; that is, on that side of the mound which had formed the surface layer of the forest floor in the undisturbed stand. This is the area on which, the litter having fallen away, the humus layer is exposed.
- (3) On the lower side; that is, that side of the mound in which the mineral soil was exposed.
- (4) In the depression created by the uprooting.

Only those stems over four feet in height were considered to be established reproduction. Practically all of these had germinated the season following the hurricane. The reproduction occurring on the 104 windfalls examined is summarized in the table on next page.

The most important feature about these data are the relatively greater proportion of birch, especially paper birch, on the top edge and lower side--the sites of greatest exposure of the mineral soil--than on the other sites. In the same area, a survey of 43 milacre plots where the soil had not been disturbed failed to reveal a single paper birch seedling or sapling, and yellow birch made up only $1\frac{1}{2}$ percent of the reproduction

on these plots. Thus of all the northern hardwood species, the birches, paper birch in particular, are probably the most dependent upon a seed-bed of exposed mineral soil.

	(1) Edge		(2) Upper		(3) Lower		(4) Depress.		Total	
Species	No.	%	No.	%	No.	%	No.	%	No.	%
Paper Birch	23	54	7	16	13	30	-	-	43	100
Yellow Birch	58	48	27	22	27	22	9	8	121	100
Pin Cherry	24	41	24	41	6	11	4	7	58	100
Striped Maple	12	37	13	41	5	16	2	6	32	100
Beech	-	-	5	36	3	21	6	43	14	100
Sugar Maple	1	17	2	33	1	17	2	33	6	100
White Ash	-	-	6	100	-	-	-	-	6	100
Red Spruce	-	-	1	100	-	-	-	-	1	100
Elderberry	-	-	4	100	-	-	-	-	4	100
Total	118	42	89	31	55	19	23	8	285	100

BEECH SCALE-NECTRIA STUDIES

In the fall of 1950, a number of areas were established in a second growth hardwood stand in order to observe the development of beech scale and Nectria following various degrees of thinning. This study is being conducted in cooperation with the Bureau of Plant Industry and the Bureau of Entomology and Plant Quarantine.

During the past spring, the areas were cut to the prescribed limits of 90, 75, and 60 square feet of basal area respectively in trees in the 5-inch diameter class and above. In one of the heavily thinned areas, the understory was mowed prior to logging. Additional mowing operations in this area will be made as needed to provide for maximum air movement within the stand.

The thinning was primarily a stand improvement measure, but still resulted in a profitable logging operation. From the total area of 21 acres, the following products were removed: 5,600 bd. ft. of low grade hardwood veneer logs; 4,500 bd. ft. of hemlock logs; 2,600 bd. ft. of white ash handle stock logs; 38 cords of paper birch boltwood; and 63 cords of hardwood pulpwood. The roadside value of these products totaled \$2,560.

T.S.I. work involving the removal of unmerchantable trees has also been completed. A trail has been constructed so that each area, including the check area, is easily accessible to visitors.

With the completion of the thinning operation, definite plans have been made for the collection of individual tree data on the buildup of beech

scale and nectria. Approximately 60 beech trees in each of the four treated areas and in the untreated check area will be permanently numbered and classified according to diameter and vigor. The vigor classification is based upon the tree's position in the crown canopy, its crown density, its soundness, and its form.

Observations on the beech scale and Nectria populations of each tree will be made periodically.

NORTHERN HARDWOOD PROBLEM AREA STATISTICS

The completion and near completion of the New Hampshire and Vermont Forest Survey reports has for the first time made it possible to obtain accurate area and volume figures for the northern hardwood problem area which includes most of the total forested area in each state. The judicious use of the same reports has been an aid in arriving at northern hardwood problem area figures in the adjoining states of Maine and Massachusetts.

The northern hardwood problem area extends through west central Maine, central New Hampshire, central and southern Vermont, and western Massachusetts. This includes a total land area of approximately 8.4 million acres--1.2 in Maine, 1.1 in Massachusetts, 2.8 in New Hampshire, and 3.3 in Vermont. Within these over-all areas, the commercial forest land areas are as follows:

Maine	908 thousand acres
Massachusetts	713 thousand acres
New Hampshire	2,293 thousand acres
Vermont	<u>2,131 thousand acres</u>
	6,045 thousand acres

The Forest Types and Sawlog Volumes in the area are as follows:

Type	Area (thousand acres)	Softwood (million board feet)	Hardwood (million board feet)	Total
White pine-hemlock	1,158	3,373	364	3,737
Spruce-fir	737	1,587	331	1,918
Aspen-paper birch	459	97	251	348
Northern hardwood	2,445)	2,038	8,022	10,060
Other hardwood	1,245)			
All types	6,045	7,095	8,969	16,064

Approximately 16% of the commercial forest is in heavy and medium sawtimber stands, 29% in light sawtimber stands, 38% in pole timber stands, 6% in seedling and sapling stands, and 11% is poorly stocked.

The population in the northern hardwood problem area is about 716 thousand, an increase of 5.3% during the last 10 years. One hundred twenty-eight thousand live on farms, 95 thousand are employed in manufacturing, of which 26 thousand are in primary wood manufactures. A breakdown of the latter figures shows 11 thousand in sawmills and allied, 2 thousand in furniture, and 13 thousand in paper and allied industries. This is exclusive of logging which is estimated to employ 8,800 men.

The roadside value of all forest products approximates \$17 million. Total wages paid in primary wood-using industries are \$64 million, and the value added by manufacture is \$123 million. These are 26 percent of total wages for all manufactures and 30 percent of the value added to all manufactured products.

IMPROVEMENTS AND MAINTENANCE OF SAMPLE PLOTS

During the quarter, the winter's logging operation was completed by cleaning up the landings and lopping and pulling the tops fifty feet back from the highway. Water bars were installed right after the snow left in the spring on all skid roads calling for this treatment.

On the Cutting Practice Level Plots explanatory signs were made and installed along the highway for the benefit of motorists and a graded trail was put through the plots. The trail is not completely finished but permits easy access to the plots.

On the beech management plots established to study scale-Nectria, maintained in cooperation with B.P.I. and BE&PQ, the treatments were completed by mowing the reproduction at Week's Brook and by cutting all trees marked but not cut in the logging operation at Bartlett.

VISITORS

The season for visitors got off to a good start the last part of the quarter, including students from the New York State College of Forestry, and the New Hampshire County Foresters group. The latter group was particularly helpful in clarifying our thinking on the small woodlot program to be undertaken this season.

The most important visitor in the Lavigne household is a son who is going to stay a long time.

HOPKINS MEMORIAL EXPERIMENTAL FOREST

Quarterly Report April-June 1952

by F. E. Cunningham

The quarter was marked by frequent, and often heavy rains. Lack of intervening drying periods handicapped our efforts in site preparation and subsequent cultivation on our planting sites. From April 1 through June 30 a total of 16.78 inches of rain was measured as compared with 13.39 inches during the same period in 1951. Despite these difficulties, the spring's planting program was completed and the first cultivation of the plots was completed.

GENETICS

Hybrid Poplars

The fourth, in a series of five test plantings of hybrid poplars was established this spring. In the Sapling Clonal Tests, 50 clones were planted in four replicates. This brings the total of clones now under test in this series to 200. When completed, 250 clones will be included. In the Crop tree tests, 25 clones were planted in two replicates. There are now 80 clones established in this series. A rather detailed description and discussion of the objectives and experimental design for this phase of the hybrid poplar program appears in last year's report for this quarter. This year's work follows the same plan and the field layout closely follows those of previous years.

Except for the clones used, the only difference between the work this year and that of previous years is that a Seaman Rototiller was used for the site preparation work. Work was started last fall but had to be postponed until this spring for two reasons. Lack of adequate equipment to pull the tiller under existing conditions and second the heavy wet soil at that time could not be properly and adequately worked. Last fall, a John Deere wheel tractor was employed to pull the tiller. It had adequate power but the wet conditions and sloping land created conditions which reduced traction. As a result, much time was lost in getting the equipment out of mudholes of its own creation. After several futile attempts, work was called off. During the winter, arrangements were made to borrow the International TD-6 crawler tractor from Massabesic to pull the rototiller this spring.

When work was resumed this spring, conditions, though still wet, were somewhat better than last fall. The TD-6 proved adequate for the job, even under difficult conditions. However, a much better job of site preparation could have been done had the ground been drier. The clods of

earth thrown up by the tiller, failed to break apart or crumble because they were so wet. On the clonal test plots, we covered the ground but once over at very slow speed. Experience has shown that with a higher speed we could cover the ground twice over and do a much better job. Our records show that an acre of ground can be prepared, once over in approximately 2.5 hours. Preparation with plow and harrow in the past has averaged about 9 hours per acre. However, since the rental cost of the rototiller is 15.00 per hour and that of the plow and harrow 4.00 per hour, the actual cost is slightly higher on the tiller than for the plow and harrow, 37.50 per acre as compared with 36.00 per acre for the plow and harrow method. All of these figures refer to actual working time and do not include time for travel, breakdowns, or other delay items. The tiller is capable of doing a much better job than the plow and harrow, when operating conditions are favorable.

Planting started on the clonal test plots on April 26 and was completed by May 2. On the whole, good weather prevailed during planting but ground conditions ranged from wet to soupy. A Willy's four wheel drive jeep was used to mark the field for planting. In a few places conditions were too wet to operate it. The TD-6 Crawler tractor proved to be a satisfactory substitute in extremely wet areas.

Cultivation was scheduled to start on May 12, approximately two weeks after planting. However, following planting, the rains resumed and continued, making it impossible to get on the land with cultivating equipment. It wasn't until June 3 that it was at all possible to start cultivating. Even then, conditions were very unfavorable. In wetter places the wheels of the tractor would sink very deeply creating ruts in which water stood. Frequently, the wheel tractor would have to be pulled through these wet places with our light crawler tractor. A very unsatisfactory job resulted. If it hadn't been for the fact that the cultivating equipment was needed at Beltsville, the work would have been postponed until conditions were more favorable. Much hand work was necessary.

A summary of the labor requirements on the clonal test plantings is as follows:

Site Preparation	10.2 hours
Marking	11.0 hours
Planting	55.0 man hours
Cultivation (Machine)	15.0 hours
(Hand)	67.6 man hours

The area involved in the above work approximated 4 acres.

Hybrid Poplar Pilot Plantations

Two pilot plantation tests with hybrid poplars were established on the forest this spring, one on more or less open pasture land and the other on a cleared woodlot to simulate cutover woodland conditions. Approximately one acre on each type was planted.

The pilot plantations consist of establishing random mixtures of the better hybrid poplar clones. On open land, strips, spaced 12' on centers are prepared by plowing and harrowing, as was the case last year, or with a rototiller as was done this spring. The tiller prepared a 5' width strip, while the plow prepared an 8' strip last year. The ground between the strips remains untouched and may be used in the future for planting short rotation crops such as Christmas trees between widely spaced poplar rows. Within the strips the poplars are spaced from 2.5' to 3' apart. In cutover woodland, because of stumps, rocks, etc., it was not feasible to prepare strips. However, logging operations, ground skidding of products, followed by pushing off piled brush with the bulldozer blade and a mild scarification of undisturbed ground with the bulldozer blade, all contributed towards preparing the ground for the poplars. On the cut-over woodland area, rows were spaced 6 feet apart and the trees were planted 2.5 to 3 feet apart in the rows.

Slightly more than 5,000 lineal feet of strip in the open land was prepared for planting in 3.5 hours working time. The tiller covered each strip twice over.

Two lots of stock were used in the above plantings. One marked "E" for Elite consisted of a random mixture of clones, all of which had a record of better than average growth in test plantings. The second lot, marked "S" for Select was a random mixture of clones, 15% of which showed better than average growth in test plantings. Each lot was planted separately in the field.

The strips on the open land were planted on April 25 and required 10 man hours to complete. Those on the cut-over woodland were planted on May 16 and 17 and required 10.5 man hours.

Originally it was planned to plant two acres of open land and an equivalent area on cut-over land. Half of the open land proved to be too wet for operating heavy equipment and the operator who had the job of cutting over the woodland, failed to get the entire two acres cleared before planting. As a result we were able to plant only half of the area originally scheduled. The remaining portions will be made ready for planting next spring.

No cultivation is planned for the plantings on the cut-over land but release cutting, as necessary, will be made. On the open land strips the first cultivation started on May 28 and required 5.25 hours with the tractor, followed up with 11 man hours of hand weeding. Wet conditions prevailed here too handicapping the work considerably.

In addition to the Pilot Plantations and the Clonal Test plantings, a special planting of selected crosses of green ash and white pine were made in prepared strips for the genetics division. Details on this work will probably be reported on by J. W. Wright.

Sugar Maple Program

In our report for the last quarter, we reported on a study designed first to locate sugar maple trees with higher than average sugar content in the sap. Since then, we have tested one more bush of some 400 trees and have made repeat measurements on selected trees at intervals throughout the sugaring season. In all a total of some 1500 trees were tested. Sugar concentrations ranged from 1.0% to over 6%. In the middle of June, greenwood cuttings were taken from approximately 1% of the total originally tested. These were selected for their relatively high sugar concentration. An attempt will be made to root these cuttings and thus obtain stock which gives reasonable assurance of a better than average sugar concentration. Portions of the cutting from each tree were sent to the Morris Arboretum for rooting and a small number from each were retained here and taken to Mount Hope Farm greenhouse, where they were placed in moist vermiculite, over low bottom heat. Future plans for this stock depend upon our success in rooting them.

REGENERATION

Hardhack Conversion

Attempts to convert brush covered land to forest growth here at Hopkins have, at best, been only moderately successful. Site preparation methods used to date have been too costly for practicable application. This spring we have expanded our efforts to include the use of a rototiller to prepare these difficult sites for planting. A study was initiated to test three degrees of site preparation and to test the response of six different tree species and six hybrid poplar clones to these treatments.

Site preparation methods were as follows: One portion of the area was treated but once over with the tiller, a second portion twice over and on the third the tiller covered three times over. Two rectangular areas, each measuring 3.0 x 2.25 chains were laid out in dense hardhack cover. Duplicate treatments and species were assigned to each unit at random. To minimize turning with cumbersome and unwieldy equipment, each rectangular unit was subdivided along its long axis into thirds; each third to receive a different intensity of site preparation. Species of trees to be planted were then assigned to each treatment unit at random.

Each replicate covered approximately 2/3 of an acre each, a rather small area from which to obtain reliable cost figures. However, the information obtained is indicative. For going over the plots, just once over, with the rototiller required approximately 2.5 hours per acre. The second trip over required an additional 2.2 hours per acre and the third trip over the ground required 2.0 hours per acre. At the rate of 15.00 per hour costs would be as follows:

Per Acre Cost for Rototilling in Hardhack

Once over	2.5 hours.	at \$15.00	\$37.50	
Twice over	2.2 hours	at 15.00	33.00	\$70.50
Thrice over	2.0 hours		30.00	\$100.50

Actually, the above costs are probably higher than would be the case on an extensive job. The small areas involved in our study required more time consuming turns than would be the case on larger areas. In our earlier study where we used a bulldozer and fire as a method for preparing the site, our lowest cost per acre was around 100.00 and the preparation job did not compare with that obtained with the tiller.

The once over treatment left a considerable amount of vegetative debris such as brush stems, roots, matted root clumps, etc. on the surface and the ground surface was rather rough. When planting, this accumulated debris and spongy root masses near the surface made it difficult to firm the trees in place. The twice over treatment resulted in less debris on the surface, though there was some; the ground was smoother and there was sufficient soil on the surface to use in firming the trees in the ground when planting. The thrice over treatment left the ground in an excellent condition, little or no debris was on the surface. The site was suitable for planting a garden. It may reasonably be expected that the stems and partially covered roots left after the once over treatment will sprout again and that release treatments for the planted stock will be necessary long before it will be needed in the other two treatments.

Planting on these hardhack areas started on April 24 and was completed on May 6, requiring a total of 31 man hours to complete. Stock used consisted of 1-0 Sugar Maple, Green Ash, 1-0 Red Oak, 2-0 Larch, 2-2 Red Pine and 3-0 White Pine. The hybrid Poplar stock, inter-planted between the 6x6 spaced other species in rows 12 feet apart were obtained from our own plantations on the forest and were selected because of their vigorous growth. The clones used were OP-21, OP-8, OP-40, OP-33, OP-226 and OP-327.

No cultivation is contemplated, though release cuttings will be made when necessary to maintain the plantation.

GENERAL

1. At the request of Robert Beals, Berkshire County Farm Forester, arrangements were made to have Dr. Alma Waterman of the Division of Forest Pathology visit the Mahkeenac Farm of Mr. John Gould of Lenox, Massachusetts to examine and diagnose, if possible, a disease which was causing mortality in a newly established planting of lombardy poplar. Accordingly, when she visited the forest in June to work on her poplar

disease program, we made the visit. Sample specimens were collected and she will attempt to identify them in New Haven. During the visit, Mr. Gould brought up the subject of sugar maple and sugar maple production, a subject he is keenly interested in. During the past spring, he tapped and processed the sap from around 1700 trees. He hopes to build it up to 4,000 in the future. He expressed a lively interest in our sugar maple testing program and its objectives. Would be interested in co-operating with us in carrying along this program in the future.

2. It may be of interest to note here that Gypsy Moth infestation has become very heavy and quite noticeable in areas around Williamstown and North Adams. Local residents and officials are concerned and are investigating measures necessary to control them next spring. Funds are being sought from local communities, the county and the State to finance adequate aerial spraying.

3. Several repair and maintenance jobs were undertaken and completed during this quarter. A footing was placed under a portion of the west wall of the apartment building to keep it from slumping further. Gutter pipes and drains were installed to carry water away from the foundation. Gutters and drains on the office residence were repaired after the usual winter's damage, and the door frame around our heeling bed was renewed.

4. Camps of both the Williamstown Boy's Club and the Girl Scouts reopened for a six week session on the forest.

5. Dr. Alma Waterman, and her assistant Kenneth Aldrich visited the forest in June to examine our poplar plantations for disease. She states that both Septoria canker and Dothachiza canker are abundant in our stands.

PENOBSCOT RESEARCH CENTER

Quarterly Report, April-June 1952

by A. C. Hart

EXPERIMENTAL FOREST

Pilot Plant Study

Cost of logging and the value of the products cut have been figured for the first harvest cut in Compartment 3. This compartment is being managed under Good cutting practice on a 10-year cutting cycle. Total cost per 100 cubic feet to roadside was \$19.54. Roadside value was \$16.35 per 100 cubic feet. This means a deficit of \$3.19 per 100 cubic feet at roadside.

Following is a summary of the costs to roadside per 100 cubic feet:

Item	Hours	Dollars
Fell, limb, peel	5.46	\$ 5.16
Skid (excluding horse hire)	3.14	3.34
Buck, pile	2.50	2.40
Swamp	0.93	0.92
Tool maintenance	.67	.60
Scale	.13	.14
Supervision	.22	.31
Horse hire	1.59	.50
Chain saw operation		.79
Logging tools and supplies		.11
Stumpage		5.21
Taxes (56 A. at \$0.256)		.06
Total	14.64	\$19.54

With the arrival of the peeling season in May, logging on Compartment 4 was suspended. To date 136 cords of rough pulpwood and 28 MBF of sawlogs have been cut. The remainder of the compartment will be cut during the coming winter. For the work done to date, costs and returns are about equal. Costs including stumpage and taxes have totaled \$3,077 compared with receipts of \$3,106.

Compartment 5 was laid out and marked for the first harvest cutting which includes 42 MBF of logs from pine and the large hemlock and spruce and 136 cords of pulpwood. In the future, cuts will be made at 20-year intervals for pulpwood only. This compartment will be managed under Good cutting practice. About seven acres of this compartment are covered by a mixed stand of aspen, fir and spruce in sizes up to 10 inches. The overtopping aspen will be removed this year to release the spruce and fir.

Compartment 6 was laid out, and the hardwood trees to be cut in the summer of 1953 were selected for a trial of chemical debarking with sodium arsenite. This compartment is to be managed under High-order cutting practice on a 10-year cutting cycle.

Small Woodlot Management

Trees in the 1952 cut on Compartment 2 were marked in May, and felled in June. The remaining jobs necessary to get the wood to the mill will be done after the peeling season is over. The cut this year consists of balsam fir windthrown or dead since the 1951 cut, and aspen and fir which, when removed, will release promising spruce trees. Mortality and windfall in the balsam fir component of the stand amounted to 4.9 cords--about 0.10 cord per acre--during the past year.

Compartment 7, more heavily stocked than Compartment 2, will be added to the small woodlot management project this year. Its boundary has been surveyed and the original inventory is in progress.

WHITNEYVILLE BURN REPRODUCTION STUDY

A survival count of seedlings on the 320-acre experimental area was made on April 18 just before the fifth growing season after the fire. This area was originally set aside in cooperation with the St. Regis Paper Co. as an airplane seeding experiment in 1948 following the big fires of 1947. The artificial seeding was a failure, but the sample milacre plots set up to study the success of the seeding project were continued to study the progress of natural regeneration.

Thirty percent of the milacres are stocked with one or more seedlings of pine, spruce or fir ranging in height from 3 inches to 12 inches. However, hardwood reproduction--red maple, aspen and birch--ranges in height from 2 feet to 12 feet. The softwoods will occupy a subordinate position in the stand for a number of years unless released.

FIRE CONTROL ACTIVITIES

During the first two days of April, Hart attended a State fire warden training meeting in Ellsworth.

The Bradley fire weather station was set up near the entrance to the experimental forest, in cooperation with the Maine Forest Service, on April 9.

There were two fires near the experimental forest during the spring fire season. The first occurred on Sunday, April 20 and burned to within 300 feet of the forest before it was controlled by the Bradley town crew and the experimental forest crew. The second, on the following Sunday, was just outside our protection unit. It was discovered by our patrolman and controlled before it burned more than a couple of acres.

FROST STUDY

Measurements on the frost study plots were completed in April. Orville Tripp, who was assigned to the project, is now working on the Green Mountain National Forest in Vermont.

CHEMICAL DEBARKING

In June McIntock and Hart visited the Penobscot Chemical Fibre Company chemical debarking demonstration in Edinburg and Milford to see the results of debarking different tree species using sodium arsenite.

We decided to try this method on hardwood trees to be cut next year on Compartment 6. To date some 600 hardwood trees with a volume of about 38 cords have been treated at an expenditure of 65 man hours. This is at the rate of 1.7 man hours per cord including the time of a tally-man who also selected the trees to be treated. Two men prepared the trees by making girdles about 6 inches wide around the bases of the trees using an axe and bark spud. One man with a pail and paint brush applied the chemical to the freshly exposed wood. From these first few days work it looks as if one gallon of the chemical will treat trees totaling about 20 cords of peeled wood. We hope by next summer when Compartment 6 is cut that the bark will be loosened on these treated trees so that no manual debarking will be necessary.

MISCELLANEOUS

Our two summer field assistants, Harold Klaiber of Syracuse University, and Eugene Carpenter of Michigan State College and the Yale School of Forestry, joined us on June 16. After an orientation period they have been assisting with the laying out and inventory of compartments and the debarking work.

The Bangor office is in the midst of a general cleaning, redecorating and floor finishing. For the past week all the furniture has been stacked into one room while the work is in progress. The walls are now

starlight blue, and the floors and woodwork are shiny with fresh varnish.

In May the film "The Living Forest" was shown at the Bangor High School, at the Hampden Academy, and at the Hampden Consolidated School. There were many favorable comments on this excellent film.

Hart gave a talk on conservation and showed "The Living Forest" at a general meeting of all Organized Reserve Corps units in Bangor in May.

Visitors

On May 2 Professor Gregory Baker of the University of Maine and H. H. Chapman visited the experimental forest. Chappie was impressed by the abundance of natural regeneration here. (All without prescribed burning!)

Professor Gordon Chapman and his class in silviculture from the University of Maine visited the experimental forest on May 13. Cutting practice level plots and the logging in Compartments 3 and 4 as well as the marking in Compartment 5 were seen and discussed.

Sims and Bickford were here during the middle of May. They visited the Bridgewater experimental cutting area and the experimental forest while here, and talked over research program plans.

On May 24 Mr. Gunnar Lytikainen and his biology class from the Bangor High School visited the experimental forest. The class was very much interested in the workings of instruments used in making tree measurements and fire weather readings as well as seeing the experimental cutting areas.

Al Orcutt, representative of the Disston Company, gave a demonstration and movies for the benefit of our logging crew and Roger Taylor of the University of Maine Forest at a chain saw clinic on the experimental forest.

Eugene I. Roe of the Lake States Experiment Station was here two days going over the experimental forest, visiting an experimental cutting area, and discussing the vulnerability of balsam fir to the spruce budworm.

WHITE PINE RESEARCH CENTER

Quarterly Report, April-June 1952

COMPARTMENT MANAGEMENT

During the quarter, the pulp and sawlog operations were completed on the Good-Patch compartment. Current cultural work, poisoning within patch cutting areas using both ammate and "Weedone 64", was completed. Both the Ammate and basal spray appear to be successful in killing red maple and oak from 1/2" to 6" d.b.h. Witch hazel appears to be more resistant to the basal spray than oak or maple.

On the High Order shelterwood compartment the work program included the conversion of 1/2 mile of old woods road to a winter truck road. After mud season this road was improved by gravelling (under contract) wet and rocky spots. This should make the road usable for year-round trucking. In addition to using the tractor with scoot, an H. G. tractor with sully was used in operating this compartment. A limited amount of hardwood pulpwood was harvested. Comparative production time figures were too small to provide a test of the merits of stump cutting with scoot hauling, versus tree and log length skidding with sully, and bucking at the landing.

RELEASE OF FOUR-YEAR WHITE PINE REPRODUCTION

In some locations on the Massabesic Forest, the catch of pine resulting from the very good 1947 seed crop was quite heavy where the fire had not been extreme. This reproduction in many locations is being suppressed by the faster growing hardwood tree and brush species. In order to maintain a high ratio of pine, it will be necessary to resort to cleaning operations on a good many areas. During the past quarter, exploratory studies were undertaken to determine the feasibility of silvicides versus the conventional cutting methods. The problem is common to large burned-over areas and to a slightly lesser extent following clear cutting of pine stands.

Release through cutting

In order to determine the class of trees that would respond to release, seedlings were grouped into three height classes, but at this time there was no attempt made to determine what degrees of release were most beneficial. All seedlings were given a full release. The mortality following release will be an important consideration. A total of 120 white pine seedlings was selected on each of two areas on the experimental forest. On one area the competing vegetation was white birch; on the other, grey birch-sweet fern. Half the seedlings were given full release,

all competing vegetation within a radius of seedling height was cut. Full release will be maintained by periodic cleanings during the growing season. Pine on the other half were tagged as a check. Annual examinations will be made to see if significant differences in height and diameter growth are apparent.

Release by using 2,4-D and 2,4,5-T Basal Sprays

As an alternative to cutting, two silvicides were used during the dormant season in an attempt to kill competing hardwoods. Different concentrations and solvents were used. In order to determine the practicability of shielding pine, if shielding is necessary, when applying the silvicides, a stove pipe was placed over the pine being released while the surrounding vegetation was being sprayed. A careful application was also made on selected unshielded pine.

Based on casual examinations made in June, it would appear that a 1% concentration of silvicide would result in a satisfactory kill of birches and sweet fern, with only moderate damage to the released pine. Stronger concentrations result in varying degrees of damage to the pine as well as some mortality. The shielded pines appear slightly better than the unshielded. It is still too early to suggest any conclusions but some additional shielding appears necessary, at least for spring treatments.

GENERAL

Robert E. Burns of Alfred was employed on May 12 to fill out our 3-man logging crew. Bob has been working in the woods for several years and we expect that he will prove a valuable crew member.

Gedney carried the I&E program for the quarter with a talk to the Chamber of Commerce at Bethel, Maine. Gedney and McConkey attended meetings of the Western Maine Forest Forum and a meeting of the State Forest Fire Wardens.

VISITORS

Professor Farnsworth, State College of Forestry, Syracuse, N. Y., and a group of about twenty students, spent May 14 on the Massabesic. They were principally interested in the concept of woodlot management and the opportunity to see the four levels of cutting practices as exemplified on the CPL area.

Sims, Bickford, and Jensen were here from April 28 to May 1 to discuss and assist in preparing working plans for the two studies in releasing white pine reproduction.

Messrs. Schaffner, Brown, and Waters, Division of Forest Insects, New Haven, Connecticut, joined the group on April 30. They were interested in the possibilities of correlating white pine weevil studies with the release studies.

